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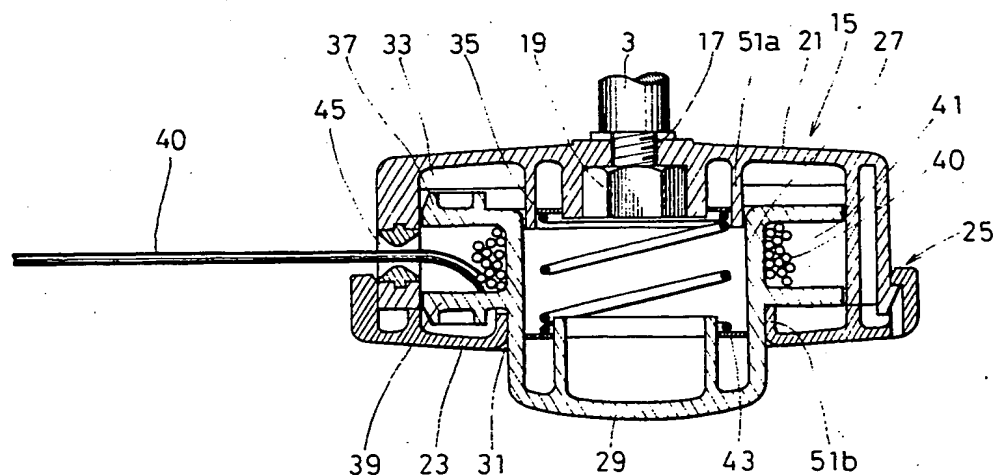
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(54) A mowing machine

(57) A mowing machine comprises a rotary casing (15) drivable by a prime mover, in which casing (15) is located a reel (27) on which can be wound a length of a cutting cord or wire (40) extending outwardly of the casing (15).

The reel (27) is provided with first and second sets of protrusions which are engagable respectively with first and second sets of spaced abutments located fast within the casing. A biasing means (43) is provided to urge the reel (27) into a position wherein one set of the protrusions engages with the respective set of abutments and means (29) is provided whereby the reel (27) can be moved against the force of the biasing means (43) to disengage said one set of protrusions from its respective set of abutments and engage the other set of protrusions with its respective set of abutments thereby causing rotation of the reel (27) to unwind therefrom a predetermined fresh length of the cutting cord (40) which then passes out of the casing (15).

Fig 2



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Fig 1

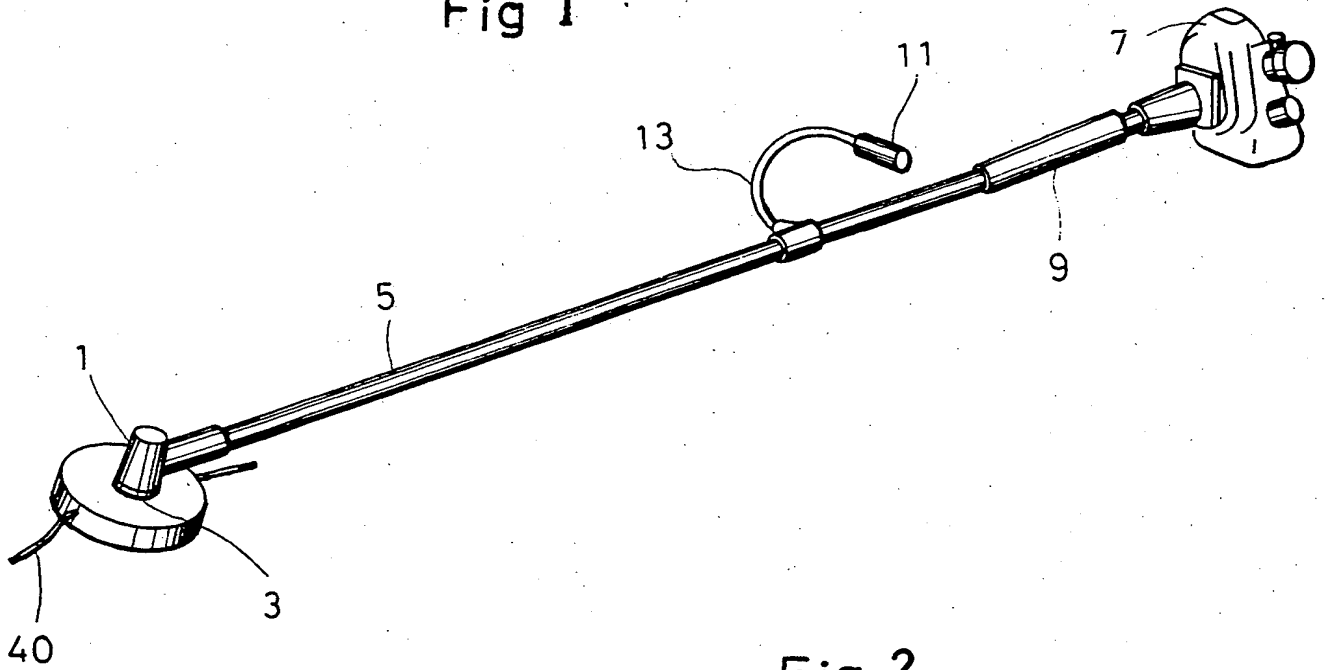
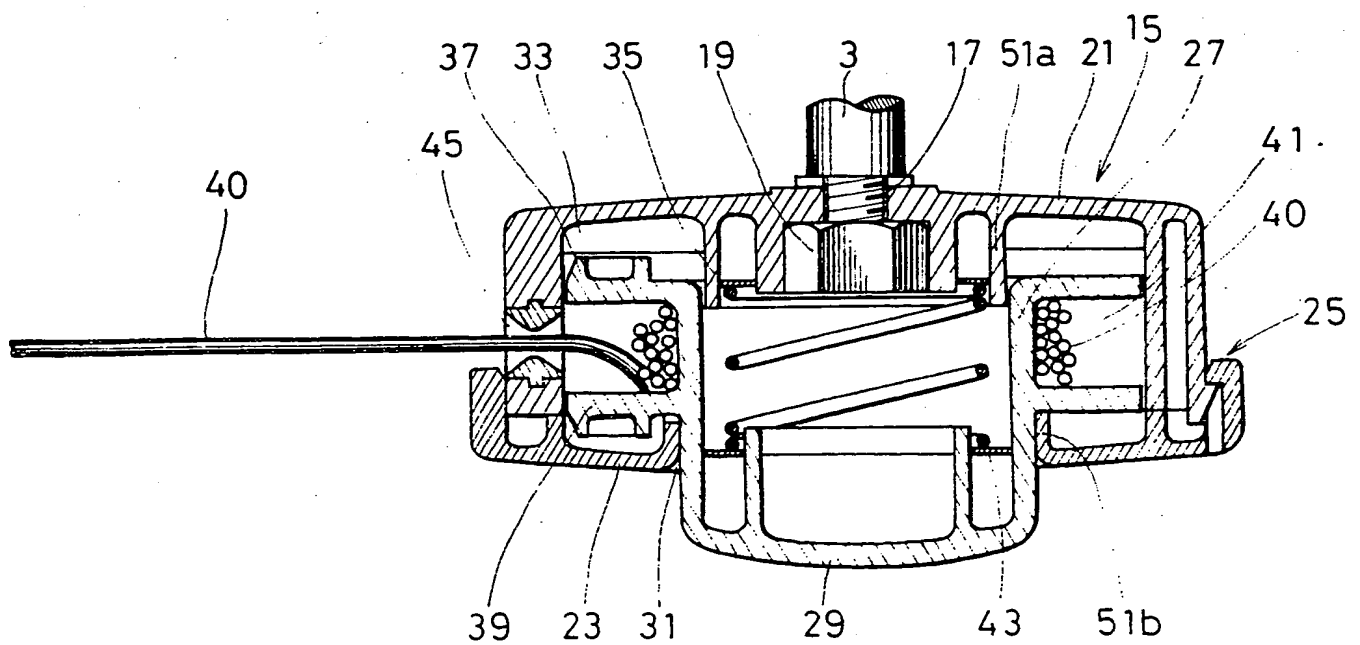


Fig 2



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Fig 3

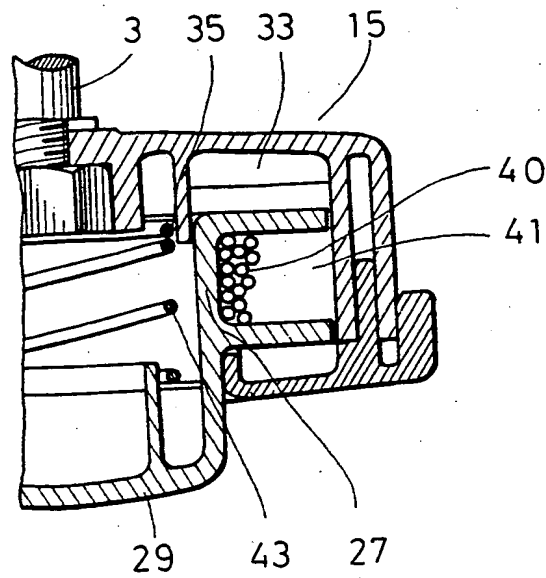
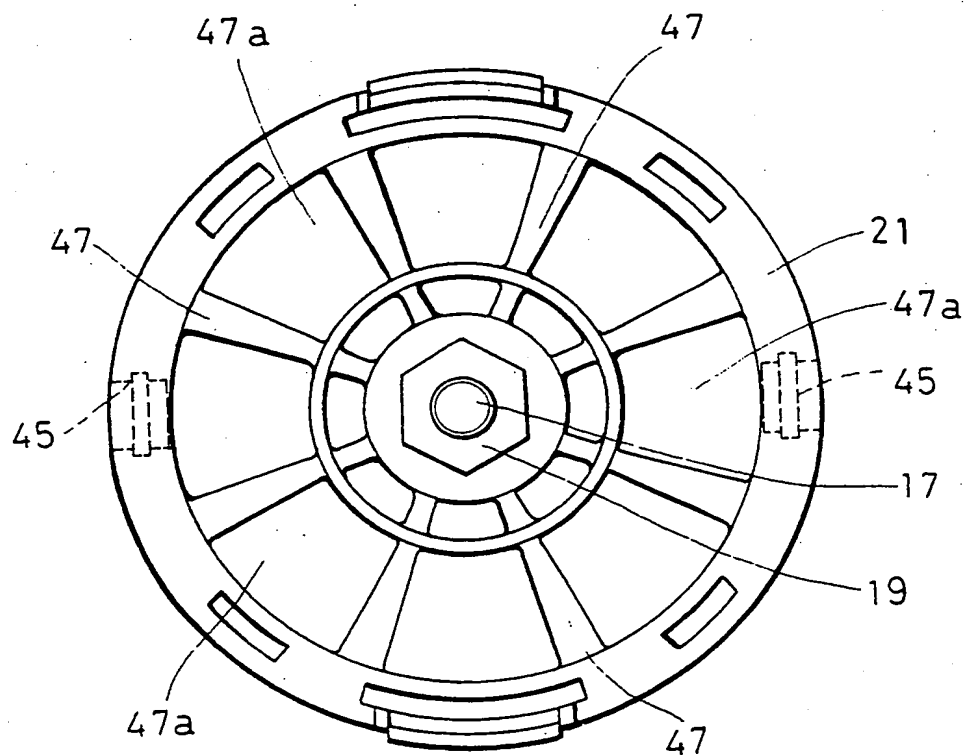


Fig 4



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Fig 5

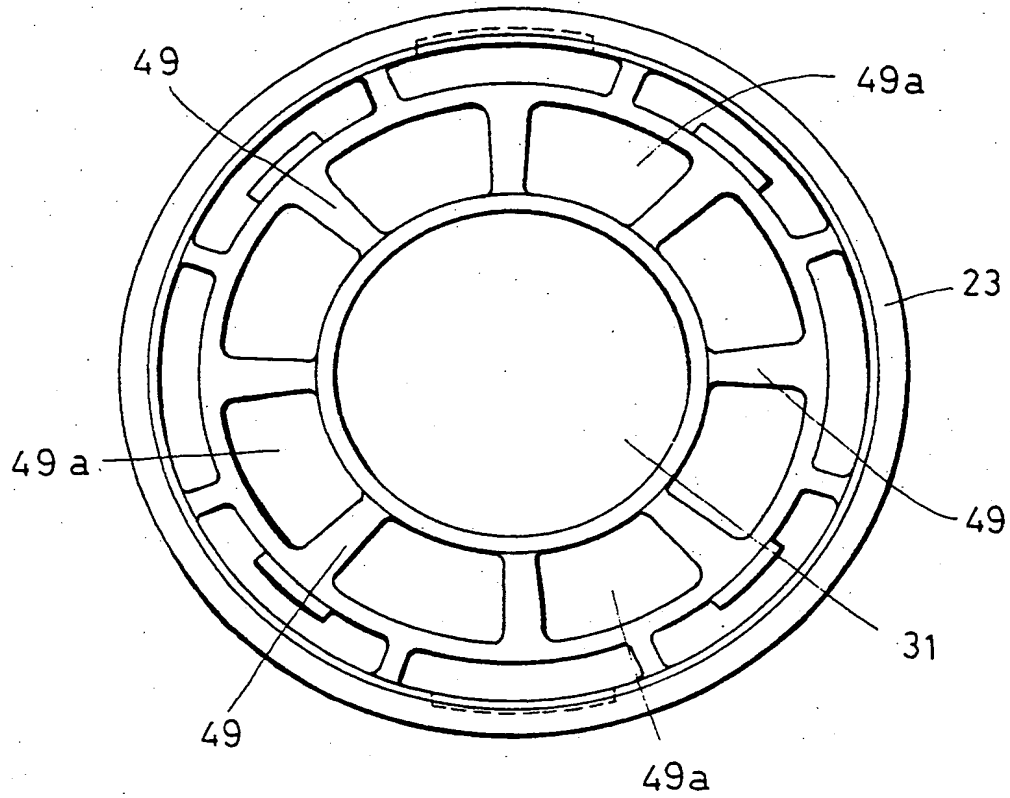
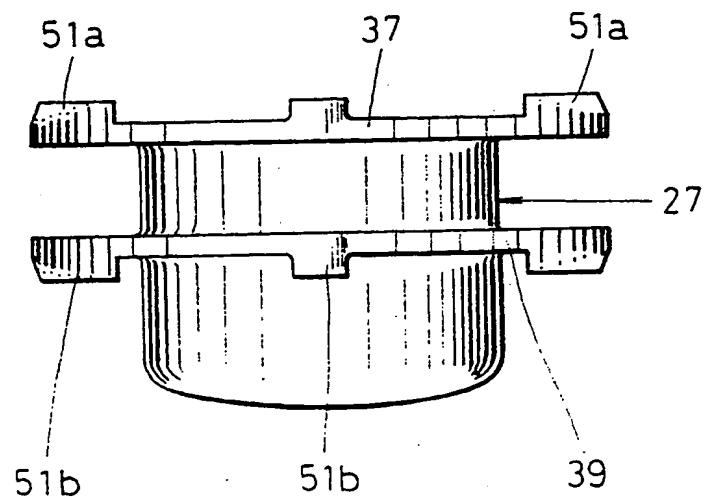


Fig 6



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Fig 7

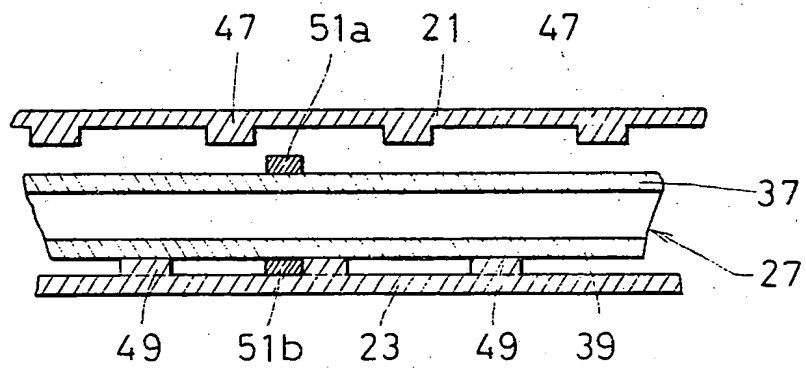
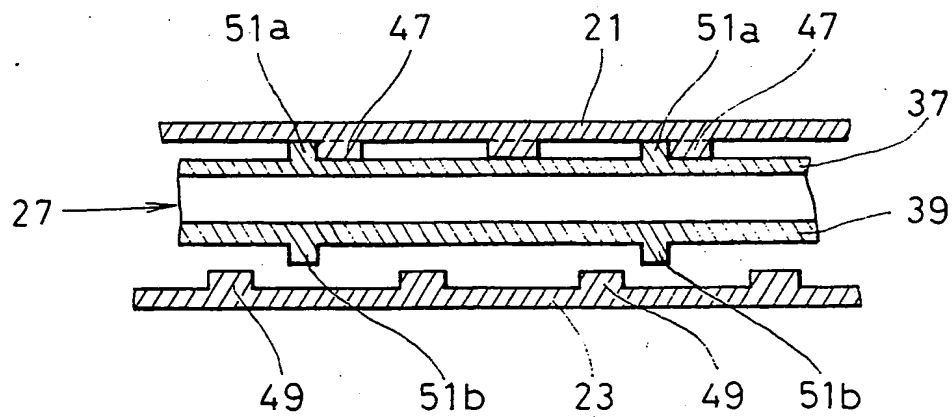


Fig 8



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Fig 9

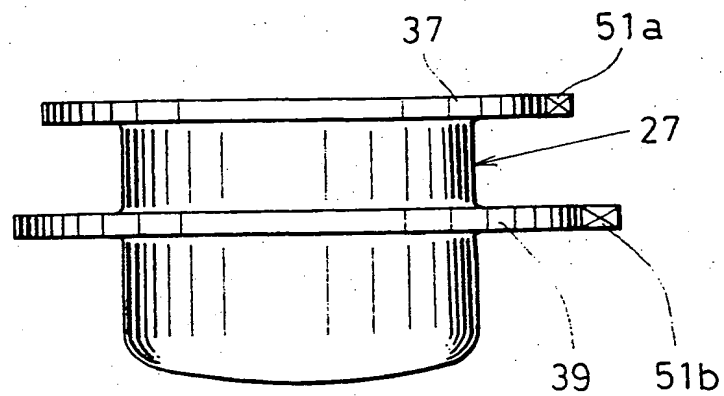
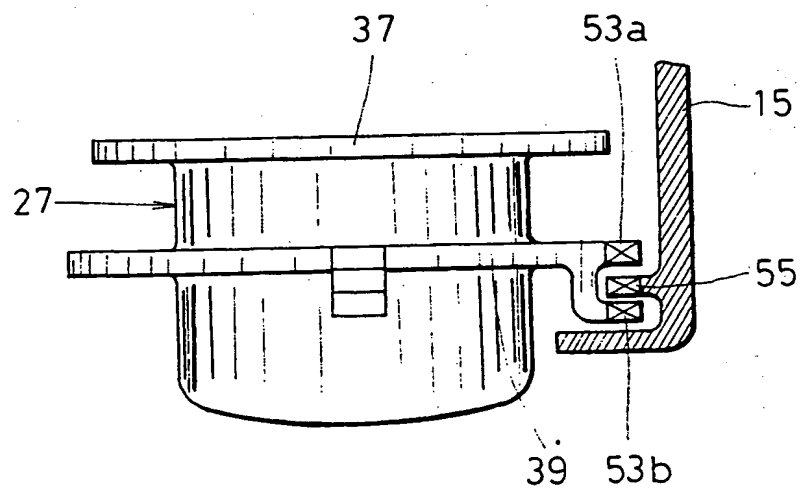


Fig 10



## SPECIFICATION

## A mowing machine

5 The present invention relates to a mowing machine for the mowing of weeds and the like.

In conventional mowing machines in which a cutting cord or wire is used, in order to replace portions of the cord which have worn or are broken through use, the operation of the machine has to be stopped and the reel in the machine on which the cord is wound must be rewound to enable a fresh length of cord of a suitable length to be drawn out. This replacement work which has to be carried out during a mowing job is considerably troublesome and causes a lowering of the work efficiency.

The object of the present invention is overcome or substantially mitigate the aforesaid disadvantage.

According to the present invention there is provided a mowing machine comprising a rotary casing drivable by a prime mover, a reel located within the casing and capable of having wound therearound a cutting cord or wire the ends of which can extend outwardly of the casing, the reel being provided with first and second sets of protrusions which are engagable respectively with first and second sets of spaced abutments located fast within the casing, biasing means whereby the reel is resiliently urged into a position wherein said first set of protrusions engage with said first set of abutments and said second set of protrusions do not engage with said second set of abutments, and means whereby the reel can be moved against the force of the biasing means to disengage said first set of protrusions from engagement with said first set of abutments and engage said second set of protrusions with said second set of abutments, said first and second sets of abutments being so disposed relative to one another that the disengagement of one set of the protrusions from one set of the abutments and the engagement of the other set of protrusions with said other set of abutments causes rotation of the reel whereby a predetermined length of the cutting cord or wire can be unwound therefrom and dispensed outwardly of the casing.

Thus, the present invention is able to provide a cutting down machine capable of dispensing a fresh predetermined length of a cutting cord or wire without the operation of the machine having to be stopped.

In addition, in an optional embodiment of the present invention the mowing machine, the sets of protrusions and abutments can be disposed so that the protrusions are located at the outer peripheral circumference of the reel so that the load exerted on the protrusions and abutments is kept low to minimize breakage of the machine.

The present invention also provides a cutting down machine in which the wasteful consumption of the cutting tape cord or wire can be reduced by causing only a small rotational movement of the reel to take place to dispense the cord or wire by increasing the number of protrusions and abutments.

The present invention will now be described by way of example with reference to the accompanying

drawings, in which:—

Fig. 1 is a perspective view of a mowing machine according to the present invention;

Fig. 2 is an enlarged longitudinal sectional view of an inner portion of a case of the machine shown in Fig. 1;

Fig. 3 is a partial longitudinal sectional view of the machine showing an engaging portion of a casing and a cover of the machine as shown in Fig. 2;

Fig. 4 is an underneath plan view of the interior of the case;

Fig. 5 is a plan view of the interior of the cover;

Fig. 6 is a front view of a reel of the machine;

Figs. 7 and 8 are sectional views of parts of the machine showing the engagement of a reel thereof with the casing; and

Figs. 9 and 10 are elevational views showing two further embodiments of a reel of the machine.

The mowing machine as shown in the accompanying drawings comprises a supporting case 1 which carries a rotary shaft 3. Attached to the case 1 is a connecting pipe 5 which is also attached to an engine 7, a rotary transmission shaft (not shown) passing through the pipe 5 to transmit the power of the engine 7 to the rotary shaft 3. A grip portion 9 is disposed fixed to the connecting pipe 5 and a second grip portion 11 is attached to a handle 13 which is attached to the connecting pipe 5. The rotary shaft 3 is screwed to an intermediate shaft 17 and made fast therewith by means of a nut 19. The nut 19 is located within a casing 15 which comprises a body portion 21 and a cover 23.

The cover 23, as shown in Figure 2, is detachably mounted on a lower surface of the body portion 21 via an engaging portion 25. In the centre of the cover 23 is an aperture 31 through which passes a projecting member 29 which is located within the casing 15 and which is formed integrally with a reel 27.

In a space 33 defined by the body 21 and the cover 23, the reel 27 is disposed and axially slidably fitted over a cylindrical shaft portion 35 defined by the body 21. At the lower portion of the reel 27, there is provided the member 29 which protrudes downward through the aperture 31.

At the sides of the reel 27 are formed annular flanges 37, 39 integrally therewith. Between the flanged portions 37 and 39 is a groove 41 to accommodate a cutting cord or wire 40.

Between an inner surface of the body portion 21 and an inner wall of the member 29, there is inserted a resilient means 43 such as a spring which biases the member 19 and the reel 27 constantly downward away from the body portion 21.

Formed in the outer circumference of the case body 21 are two apertures 45 through each of which an end of the cutting cord or wire 40, which is wound around the reel 27, protrudes.

On the lower interior wall of the body portion 21 and an upper wall of the cover 23 are disposed radially extending reinforcing ribs with a predetermined spacing 47, 49 respectively as illustrated in Figs. 4 and 5.

On the upper surface and the lower surface of the flanged portions 37 and 39 respectively are integrally formed with first engaging protrusions 51a and sec-

and engaging protrusions 51*b* at respectively opposed positions with a predetermined spacing therebetween which enable them to engage respectively the ribs 47 and 49.

5 Said first and the second protrusions 51*a* and 51*b* are constructed in such a manner that on rotation of the reel 27 they can rotate clockwise or anticlockwise in annular recessed portions 47*a*, 49*a* formed between the ribs 47 and 49. During mowing the second  
10 engaging protrusions 51*b* of the flanged portion 39 of the reel 27 engages with the ribs 49 of the cover portion 23, causing the body portion 21 to move integrally therewith.

15 The first and the second ribs 47 and 49, of which there are eight in number and which are equally spaced, are disposed so that they are not in phase with each other. There may be a greater or lesser number of each set of ribs 47, 49.

Correspondingly to these sets of ribs 47, 49, the  
20 first and the second engaging protrusions 51*a* and 51*b*, which are each four in number, are disposed circumferentially respectively, at 90° interval. Said first and the second engaging protrusions 51*a* and 51*b* are disposed in the same phase.

25 In order, therefore, for the first and the second engaging protrusions 51*a* and 51*b* to locate in their respective positions between the ribs 47 and 49 they are disposed out of phase with both sets of ribs, as shown in Figs. 7 and 8.

30 In a modification, the number of the first and the second engaging protrusions 51*a* and 51*b* may be altered and either increased or decreased.

In operation of the mowing machine, an operator grasps the grip portions 9 and 11, and the engine 7 is  
35 activated to rotate the shaft 3. The protrusions 51*b* of the reel 27 abut against and engage the ribs 47 of the body portion 21 so that the reel 27 and the case 15 rotate as one. The respective positions of the protrusions 51*a* and 51*b* and the ribs 47 and 49 being as shown in Fig. 7 owing to the influence of the spring  
40 43.

When the case 15 and the reel 27 are rotated, the cutting cord or wire 40 protruding outwardly from the apertures 45 formed in the body portion 21  
45 extends radially outwards and is rotated so that it forms a cutter to mow down grass or long weeds and the like.

When the protruding end portions of the cord or wire becomes broken or worn and thereby shortened in length in order to replace said ends during  
50 use of the machine, the casing 15 is left rotating and the member 29 is pressed against the ground or other hard surface against the force of the spring 43 to release the engagement of the reel 27 and the casing 15. This enables the reel 27 to enter an intermediate position between ribs 47 and 49 whereafter the reel 27 is forced by the centrifugal force of the cord or wire 40, to move further against the force of the spring 43 and to cause the first engaging protrusions 51*a* to be located between the ribs 47. This  
60 state is shown in Fig. 8.

When the member 29 is then separated from the ground or hard surface, the reel 27 and the member 29 are moved downward by the action of the spring  
65 43 so that the first engaging protrusions 51*a* are dis-

engaged from between the ribs 47, while the second engaging protrusions 51*b* enter the recesses between the ribs 49. As this occurs, the reel 27 is rotated by the centrifugal force of the cord or wire 40 so that the protrusions 51*a* abut against and engage with the adjacent ribs 49.

A length of cord or wire 40 is dispensed outwardly of the casing 15 and corresponds to the distance between the adjacent ribs 49.

75 In the abovedescribed embodiment, the reel 27 and the member 29 are formed integrally but they could be constructed separately.

Fig. 9 illustrates a second embodiment of reel 27 for use in the present invention. In this second  
80 embodiment, the first and the second engaging protrusions 51*a*, 51*b* are formed integrally on peripheral circumferential edge of the flanges 37, 39 of the reel 27 with a predetermined spacing therebetween.

Fig. 10 shows a third embodiment of reel 27. In this  
85 embodiment, the flange 39 is formed with an upper and a lower portion and engaging protrusions 53*a*, 53*b* are formed therewith. These protrusions 53*a*, 53*b* integrally are adapted to engage with a complementary engaging portion 55 of the casing 15.

90 Since in accordance with the present invention, there are provided a plurality of ribs 47, 49 forming complementary engaging members with the protrusions 51*a*, 51*b*, and the protrusions 51*a*, 51*b* engageable with said ribs 47, 49 and the member 29 protrudes from the lower surface of the reel 27, the following advantages are obtained:—

(1) When the cutting cord or wire 40 is broken or worn, a fresh predetermined length thereof can be dispensed with ease so that the operating efficiency  
100 of the machine is enhanced.

(2) The inter-engaging portions of the casing and the reel can be disposed in the vicinity of the outer circumference of the reel, so that load applied to these engaging members can be lowered and the breaking and wearing of these members reduced.

(3) Since the engaging members can be located in a position near to the outer peripheral portion of the reel, the number of engaging members required can be maximised so that the delivered length of cord or wire can be decreased so that wasteful consumption  
110 of the cord or wire can be prevented.

#### CLAIMS

1. A mowing machine comprising a rotary casing drivable by a prime mover, a reel located within the casing and capable of having wound therearound a cutting cord or wire the ends of which can extend outwardly of the casing, the reel being provided with first and second sets of protrusions which are engageable respectively with first and second sets of spaced abutments located fast within the casing, biasing means whereby the reel is resiliently urged into a position wherein said first set of protrusions engage with said first set of abutments and said second set of protrusions do not engage with said second set of abutments, and means whereby the reel can be moved against the force of the biasing means to disengage said first set of protrusions from engagement with said first set of abutments and engage said second set of protrusions with said second set of abutments, said first and second sets of  
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abutments being so disposed relative to one another that the disengagement of one set of the protrusions from one set of the abutments and the engagement of the other set of protrusions with said other set of abutments causes rotation of the reel whereby a predetermined length of the cutting cord or wire can be unwound therefrom and dispensed outwardly of the casing.

2. A machine as claimed in claim 1, wherein one set of the protrusions is formed in the vicinity of the outer circumference of the reel, and said first and second sets of abutments are formed on the inner surface of the casing.

3. A machine as claimed in claim 1, wherein the first and second sets of abutments are formed on inner side surfaces of the casing and both said first and second sets of protrusions are disposed in the vicinity of the outer peripheral circumference of the reel.

4. A machine as claimed in claim 1, wherein said first and second sets of protrusions each comprise a single protrusion.

5. A machine as claimed in claim 1, wherein said first and second set of abutments each comprise a single abutment.

6. A machine as claimed in any of claims 1 to 3 wherein the first and the second sets of abutments each comprise a plurality of spaced reinforcing ribs for the casing.

7. A machine as claimed in any of the preceding claims, wherein said means for moving the reel against the biasing means is formed integrally with the reel.

8. A machine as claimed in any one of claims 1 to 6, wherein means for moving the reel against the biasing means is constructed separately from the reel.

9. A moving machine substantially as hereinbefore described with reference to Figs. 1 to 8 or Fig. 9 or Fig. 10 of the accompanying drawings.

